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PERSONAL REFLECTIONS ON THE DIPLOMATIC AND POLICY IMPLICATIONS OF THE ENVIRONMENTAL CONSEQUENCES OF NUCLEAR WAR (NW) (SUMMARY STATEMENT).

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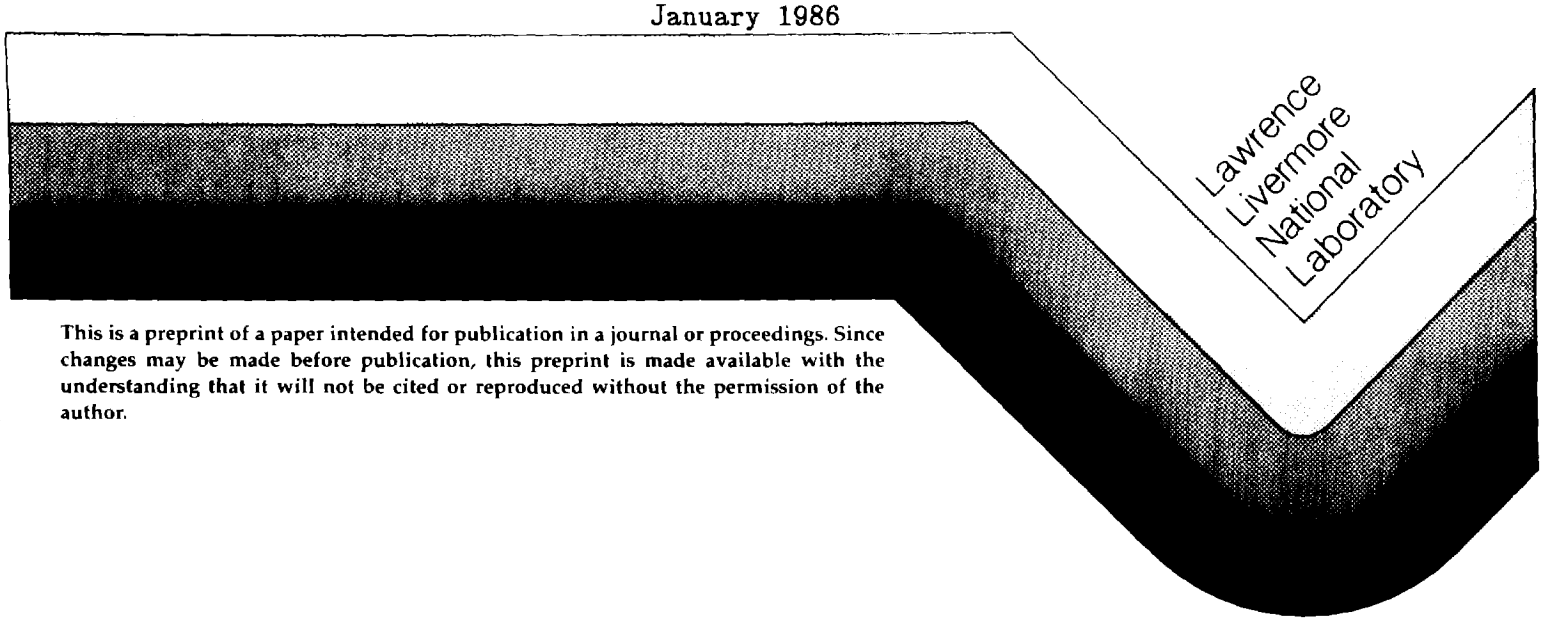

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PERSONAL REFLECTIONS ON THE DIPLOMATIC AND POLICY IMPLICATIONS OF THE ENVIRONMENTAL CONSEQUENCES OF NUCLEAR WAR (NW) (SUMMARY STATEMENT).[1]

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BACKGROUND REMARKS:

1. The two superpowers have real, long term, unyielding differences in their respective political systems; each may be assumed to change only slowly in the future.

2. The balance of terror (or MAD) has existed for the past 25 of the 43 years of the nuclear age; nuclear deterrence has worked in regard to suppressing major conflicts and another World War.

3. Awareness of the immense human tragedy to ensue if nuclear deterrence were to fail has been recognized for a long time; more specifically, in 1979 publications indicated that indirect casualties of nuclear war (NW) could equal the direct casualties because of the collapse of the infrastructures in developed countries, and the resulting impacts on food supplies to the dependent non-combatant nations.

4. The hypothesis of nuclear winter (1982-86) is important today not because it is proven or unproven, but for an entirely different reason. While discussion has focused on why some call the theory implausible or questionable and some claim it is robust and certain, the most important characteristics of nuclear winter are its inherent uncertainty, untestability, and the unknowability of details

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1. This work performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

5. The importance of preventing intentional NW and accidental NW is something we can all agree on, whether or not we can agree at this time on the hypothesis of "nuclear winter." We must seek new directions and goals that lead us towards mutual assured survival.

DISCUSSION OF UNCERTAINTIES

Estimates of the environmental consequences of NW are remarkably sensitive to our assumptions, approximations, and ignorance. Perhaps the most illuminating example is the sensitivity of the mean Northern Hemisphere land surface temperature to the absorption optical depth (τ_a) (Fig. 1), which is proportional to smoke amount. A factor of four or five reduction in smoke amount from initially assumed values transforms significant impacts into small ones. The corresponding range in smoke loading of the atmosphere is from a few tens of MMT to over 100 MMT--or the range of the current debate. The uncertainties regarding available fuel, emission factors, scenario realism, targeting, and early scavenging processes can easily change τ_a by a factor of ten or more; hence, the lower impacts.

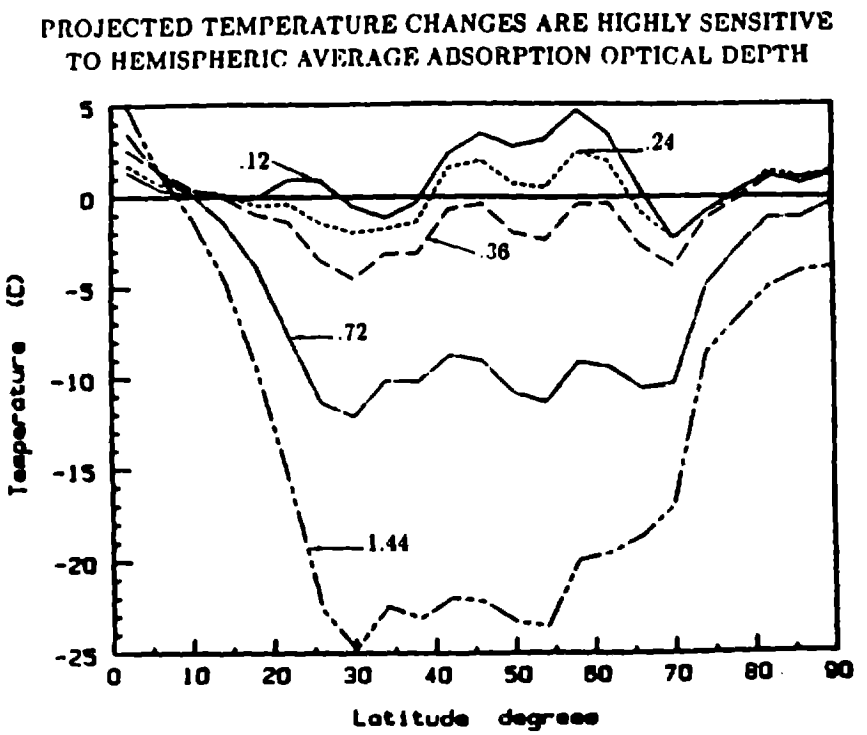

Fig. 1. The projected surface temperature on day 10 for various values of the mean hemispheric absorption optical depth as a function of latitude. (Knox, 1985.)

POTENTIAL POLICY IMPLICATIONS:

This dramatic sensitivity of environmental consequences implies that there are significant potential policy implications in the emerging understanding of these consequences. Some of these implications are:

1. A factor of a few reduction in strategic nuclear armaments could make an important difference in the climatic consequences of NW, especially since this may preferentially reduce warheads targeted on smoke-generating areas.

2. A military option of modernization of nuclear forces could reduce potential impacts by lowering nuclear yields, by increasing accuracy of delivery systems, and by using earth penetrating systems to reduce ignition of combustibles. Such avenues of modernization could lessen the environmental consequences of nuclear war, should the decision makers require this form of option.

3. Since the post-attack environment will not preclude human survival of a NW, life saving endeavors such as revitalized civilian defense should receive renewed attention against the low probability of the failure of deterrence.

4. A less than perfect strategic defense shield could save lives by markedly reducing the number of ignited combustibles in urban areas, and hence, make the severe "nuclear winter" even more improbable.

MYTHS OF RECENT INVENTION:

1. The myth of the 100 MT city attack having about the same emissions as the 5000 Mt baseline scenario requires ~200 "special," highly smoke producing cities, each the size of San Francisco and all developed as highly as Manhattan Island (i.e., completely covered by major urban development).

2. The WHO studies of prompt casualties (1.1 Billion dead and 1.1 Billion injured) assumed that about ninety percent of the megatonnage would be directed at non-superpower nations.

The technological potential for terror is distinctly greater than and, indeed, different from the impacts of plausible scenarios; to exaggerate the plausible greatly reduces the possibilities for communication with decision makers. Our decision makers need reliable and accurate information on the consequences of nuclear war, not information interspersed with myths. Even the reliable information, as it emerges from careful research, will be sufficient for deterrence.

STRATEGIC DEFENSIVE SYSTEMS:

1. There is a current consensus in support of conducting the SDI research program in the US; any deployment in future years should be done only after full consideration of strategic implications, including negotiations and consultations with appropriate nations including the SU.

2. Assuming that significant, balanced, verifiable, nuclear arms reductions are achieved, the transition to a new security might involve the concept of a planetary scale, international defensive shield to guard all nations from rapid proliferation, nuclear terrorism or blackmail, and nuclear breakout and threatened aggression by any nation. With suitable choice of technology, this might be achieved without nuclear weapons in space.

CONCLUSION:

Mankind and our decision makers need reliable, accurate, and matured information on the environmental consequences of nuclear war as we continue on the long journey toward a more secure world involving less risk and mutual assured survival.